IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

900 North Skyline, Idaho Falls, ID 83402-1716, (208) 528-2650 Cecil D. Andrus, Governor

August 30, 1994

Mr. Talley Jenkins
Office of Program Execution
Environmental Restoration
850 Energy Drive
Idaho Falls, ID 83401

RE: IDHW/DEQ Informal Comments on *Technical Memorandum Assessment of PORFLOW Boundary Conditions for Use in the ICPP Unsaturated Zone Model and Attachment A - Assessment of the Cylindrical Coordinate Option in PORFLOW*

Dear Mr. Jenkins:

The Idaho Department of Health and Welfare, Division of Environmental Quality (IDHW/DEQ) has reviewed the *Technical Memorandum Assessment of PORFLOW Boundary Conditions for Use in the ICPP Unsaturated Zone Model and Attachment A - Assessment of the Cylindrical Coordinate Option in PORFLOW.* The document was received on July 25, 1994. We suggest revising the document to incorporate/address our attached comments and resubmission of the document to IDHW/DEQ for review. If you should have any questions, please feel free to contact us at (208) 528-2651.

Sincerely,

Scott L. Reno

Scott L. Reno
Environmental Scientist
Remediation Bureau

Attachment

cc: Shawn Rosenberger, DEQ-EIRO
Gerry Winter, DEQ-Boise
Bruce Wicherski, DEQ-Boise
Linda Meyer, EPA Region X
Rob Rice, MSE, Inc.
File, DEQ-Boise

IDHW/DEQ INFORMAL COMMENTS ON THE Technical Memorandum Assessment of PORFLOW Boundary Conditions for Use in the ICPP Unsaturated Zone Model July 22, 1994

General Comments

The organization of this technical memorandum makes evaluation of the conclusions extremely difficult. There are multiple reasons for this. They include:

1) Copying of equations and documentation straight out of the PORFLOW user's manual. Most of the equations in the report are presented in a very general form and use variables that are poorly defined (both in the report and in the user's manual itself). It would be preferable to use terminology that is in more general usage in order to enhance understandability.

2) The conceptual model used in the computer simulations themselves is not shown in any figures or described narratively. Which boundary conditions are applied for each run for all sides of the domain?

3) The simulation input parameters are only presented in the form of the PORFLOW input format which, again, is difficult for those who do not regularly use the software to understand.

4) The objective of the memorandum is never clearly presented, how the objective will be achieved is not given, and the purpose of the various simulations is not detailed.

5) Nowhere in the text is the output of the simulations referred to and an explanation of how the simulation output itself supports the conclusions reached regarding selection of boundary conditions is not given. The graphics do not stand alone.

Specific Comments

Section 4. Unsaturated Contaminant Transport Boundary Conditions, last page before Section 5

It would help the discussion greatly to include appropriate figure references in this part of the text. The figures do not stand alone and the text is incomplete without the figures.

First paragraph of indent, lines 5 & 10

It would be helpful to designate the nature of the gradient discussed in the text in these

two locations. It must be assumed that either hydraulic or concentrations gradients are intended.

First paragraph of indent, lines 9 - 12

It is not intuitively obvious why the designation of either a "flux or gradient equal to zero..." also "provides a mass component outside of the boundary for movement into the domain with the velocity component." This aspect of the model should be discussed in greater detail.

Last paragraph of indent, lines 3 - 4

The document states that "The contaminant is not allowed to leave by dispersion, however, it does exit this boundary by the advective term, V_xC." Please explain why dispersion is not considered at the bottom boundary.

Plots of PORFLOW Output - Comparison of First and Second Type Boundary Conditions and the Advective and Dispersive Components

The plots of model output for the simplified problem are confusing. It would help to know the point in the grid for which the output are plotted. It is assumed that the location corresponds to the model input example and that the location for the plots is 20,50. It also would help to have some explanation accompanying the plots to explain the scenarios tested. Also, please explain where the boundary conditions are applied. Some plots appear to have the specified boundary condition applied at the bottom of the grid. The reader must assume the location for the boundary condition tested and displayed in the memorandum.

The plot for "Flux Time History for the Concentration = 0 Boundary Condition" for flux versus time is difficult to understand. It appears that more total contaminant can migrate with the dispersive model than with the advective (convective) model. The total mass of the contaminant that can migrate appears to decrease if only advective transport is considered, which is illogical. The term advective is preferred instead of convective as the later term implies heat flow to some readers.

The last plot ("Flux Time History for the Gradient = 0 Boundary Condition") only shows one output line, which one must assume is the same for both cases ("Convective" and "Dispersive"). If that is not the case, it should be pointed out to the reader.

Plots of PORFLOW Output - Comparison of Cartesian and Cylindrical Coordinate Results

The results of the runs appear reasonable. However, it should be noted that the greatest problem will probably be agreeing to the conceptual model for the all or part of the sources that may be included in the model. A simplified geometry may not be reasonable in all cases. The conceptual model will be the most difficult test, not the representiveness of the simulation schemes.